Using high resolution spatial data and genetic algorithms to optimize riparian zone condition and impervious cover estimates in New England watersheds.

Jessica Morgan[1], N. Detenbeck[2], S. Rego[2], Y.Q. Wang[3]

[1] ORISE Fellow U.S. EPA, ORD, NHEERL Atlantic Ecology Division, Narragansett, RI

Ph.D. Student, Department of Natural Resources Science, University of Rhode Island, Kingston, RI

[2] U.S. EPA, ORD, NHEERL Atlantic Ecology Division, Narragansett, RI

[3] Department of Natural Resources Science, University of Rhode Island, Kingston RI

Under EPA's Green Infrastructure Initiative, a variety of research activities are underway to evaluate the effectiveness of green infrastructure in mitigating the effects of urbanization and stormwater impacts on stream biota and habitat. One aspect of this is evaluating the effectiveness of landscape-scale natural green infrastructure, specifically forested riparian buffers. Preliminary analyses, using impervious cover estimates from the 30-meter resolution National Landcover Dataset (NLCD), have indicated that biotic communities are impacted at much lower levels of watershed imperviousness than previously reported in the literature. The 30-meter resolution NLCD data likely underestimate impervious cover, particularly in suburban areas where impervious surfaces can be masked by vegetation and trees. Minimally disturbed forested buffer zones can help to mitigate the effects of urbanization, even when the natural functions of riparian zones are reduced or bypassed by stormwater drainage infrastructure. However, fine scale resolution at broad spatial extents has been difficult. The purpose of this research is to improve EPA's assessments of impervious cover and riparian zone land cover classification by conducting high resolution image analysis using GIS, genetic algorithms, and 1-meter resolution imagery from the National Agricultural Imagery Program (NAIP) program. Ancillary data sets such as road networks, National Wetlands Inventory (NWI) data, the National Hydrography Dataset (NHD), LiDAR, and E911 data will be utilized to optimize estimates of riparian zone condition and impervious cover.

Classification accuracy assessment will compare the improved classifications to previously established impervious cover and riparian zone condition estimates from state and local high resolution data sets. These improved estimates will be used to evaluate critical riparian zone widths required for mitigation of urbanization effects at varying spatial resolutions, as well as to evaluate macroinvertebrate, fish, and periphyton model and threshold accuracy. The results of the project will help to better inform management strategies and regulation of development for suburban and urban areas.